IN THE CLAIMS:

1. (Currently Amended) A method for receiving and decoding signals in a multicarrier transmission system comprising the steps of:

receiving a multicarrier signal;

applying Fast Fourier transformations to carriers of said multicarrier signal;

estimating channel characteristics of a multicarrier channel over which said multicarrier signal was transmitted using iterative forward processing; and

decoding said transformed multicarrier signal.

2. (Currently Amended) The method according to claim **1**, wherein said iterative forward processing comprises the steps of:

~~determining if a block in a frame in the received signal is a training block;~~

~~tentatively decoding said block of said received signal;~~

~~calculating a tentative reference signal based on a previous training block;~~

~~generating a tentative estimation of channel characteristics using said tentative reference signal;~~

~~decoding said block of said received signal;~~

~~calculating a reference signal based on said received block;~~

~~generating an estimation of channel characteristics using said reference signal;~~

~~incrementing the block number;~~

~~determining if the end of said frame has been reached;~~

~~accepting a next block of received signal if said end of said frame has not been reached; and~~

~~iteratively performing the steps above~~

accepting a transformed block of a frame from said step of applying Fast Fourier transformations, said transformed block having an associated ordinal number;

determining whether said block, is a training block;

if said transformed block is a training block

(a) calculating a tentative reference signal of said multicarrier signal;

(b) generating a tentative estimation of channel characteristics using said tentative reference signal;

(c) incrementing said ordinal number;

(d) returning to said step accepting if said ordinal number indicates that an end of said frame has not been reached;

if said transformed block is not a training block,

(f) decoding said transformed block of said received multicarrier signal;

(g) re-calculating said reference signal based on said transformed block and results of said decoding;

(h) re-generating said estimation of channel characteristics, using the reference signal re-calculated in step (g);

(i) re-decoding said transformed block using the estimation of channel characteristics ge-generated in step (h); and

(j) returning to step (a).

3. (Currently Amended) The method according to claim **2**, wherein said decoding and re-decoding steps are performed using $\hat{\mathbf{c}}_n = \arg\min_{\mathbf{c}_n} \sum_m \|\mathbf{x}_{m,n} - \hat{\mathbf{H}}_{m,n}\mathbf{c}_n\|^2$, where $\mathbf{x}_{m,n}$ is the transformed block, $\hat{\mathbf{H}}_{m,n}$ is said estimation of channel characteristics, $\mathbf{c}_n$ is a vector of known result values, and $\hat{\mathbf{c}}_n$ is a vector of the decoded results.

4. (Delete).

5. (Delete).

6. (Delete).

7. (Currently Amended) The method according to claim **1**, where each of said decoding steps ~~further~~ comprises the steps of:

demodulating said multicarrier received signal;

~~combining said demodulated multicarrier signal using a maximum ratio combiner;~~ and

Viterbi decoding the demodulated multicarrier signal.

8. (Currently Amended) The method according to claim **7**, further comprising the step of deinterleaving ~~said combined signal if said combined signal was interleaved for transmission~~ the demodulated multicarrier signal prior to Veterbi decoding said multicarrier signal if said multicarrier signal was interleaved for transmission.

9. (Currently Amended) The method according to claim **7**, wherein said steps of receiving and applying are carried out on at least two separate concurrently received multicarrier signals, said step of estimating is responsive to signals developed from said at least two separate concurrently received multicarrier signals, and said step of demodulating includes a step of demodulating each of said at least two separate concurrently received and transformed multicarrier signals and combining the demodulated signals using a maximum ratio combiner.

~~decoding step further comprises the steps of:~~

~~demodulating said multicarrier received signal;~~

~~combining said demodulated multicarrier signal using a maximum ratio combiner; and~~

~~Viterbi decoding said combined signal~~

10. (Currently Amended) The method according to claim **9**, where the step of combining uses a maximum ratio combiner ~~further comprising the step of deinterleaving said combined signal if said combined signal was interleaved for transmission~~.

11. (Original) The method according to claim **7**, wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

12. (Original) The method according to claim **9** , wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

13. (Delete).

14. (Delete).

15. (Original) The method according to claim 1, wherein Fast Fourier transformations are applied to each carrier of said multicarrier signal.

16. (Original) A method for estimating channel characteristics in a multicarrier transmission system comprising the steps of:

receiving a multicarrier signal;

applying Fast Fourier transformations to carriers of said multicarrier signal;

estimating channel characteristics of a multicarrier channel over which said multicarrier signal was transmitted using iterative backward processing, wherein said iterative backward processing further comprises the steps of;

determining if a block in a frame in the received signal is correct;

tentatively decoding said block of said received multicarrier signal;

calculating a tentative reference signal based on a previous training block;

generating a tentative estimation of channel characteristics using said tentative reference signal;

decoding said block of said received multicarrier signal;

calculating a reference signal based on said received block;

generating an estimation of channel characteristics using said reference signal;

decrementing the block number;

determining if the beginning of said frame has been reached;

accepting a next block of received signal if said beginning of said frame has not been reached;

iteratively performing the steps above; and

decoding said transformed multicarrier signal.

17. (Delete).

18. (Delete).

19. (Delete).

20. (Delete).

21. (Original) The method according to claim **16**, wherein said decoding step further comprises the steps of:

demodulating said multicarrier received signal;

combining said demodulated multicarrier signal using a maximum ratio combiner; and

Viterbi decoding said combined signal.

22. (Original) The method according to claim **21**, further comprising the step of deinterleaving said combined signal if said combined signal was interleaved for transmission.

23. (Original) The method according to claim **21**, wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

24. (Original) The method according to claim **21**, wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

25. (Delete).

26. (Original) The method according to claim **16**, wherein Fast Fourier transformations are applied to each carrier of said multicarrier signal.

27. (Original) A method for estimating channel characteristics in a multicarrier transmission system comprising the steps of:

receiving a multicarrier signal;

applying Fast Fourier transformations to carriers of said multicarrier signal;

estimating channel characteristics of a multicarrier channel over which said multicarrier signal was transmitted concurrently using iterative processing and iterative backward processing; and

decoding said transformed multicarrier signal.

28. (Original) The method according to claim **27**, wherein said iterative forward processing further comprises the steps of:

determining if a block in a frame in the received signal is a training block;

tentatively decoding said block of said received multicarrier signal;

calculating a tentative reference signal based on a previous training block;

generating a tentative estimation of channel characteristics using said tentative reference signal;

decoding said block of said received multicarrier signal;

calculating a reference signal based on said received block;

generating an estimation of channel characteristics using said reference signal;

incrementing the block number;

determining if the end of said frame has been reached;

accepting a next block of received multicarrier signal if said end of said frame has not been reached; and

iteratively performing the steps above.

29. (Original) The method according to claim **27**, wherein said interactive backward processing comprises the steps of:

determining if a block in a frame in the received multicarrier signal is correct;

tentatively decoding said block of said received multicarrier signal;

calculating a tentative reference signal based on a previous training block;

generating a tentative estimation of channel characteristics using said tentative reference signal;

decoding said block of said received multicarrier signal;

calculating a reference signal based on said received block;

generating an estimation of channel characteristics using said reference signal;

decrementing the block number;

determining if the beginning of said frame has been reached;

accepting a next block of received multicarrier signal if said beginning of said frame has not been reached; and

iteratively performing the steps above.

30. (Original) The method according to claim **27**, wherein said decoding step further comprises the steps of:

demodulating said multicarrier received signal;

combining said demodulated multicarrier signal using a maximum ratio combiner; and

Viterbi decoding said combined signal;

31. (Original) The method according to claim **30**, further comprising the step of deinterleaving said combined signal if said combined signal was interleaved for transmission.

32. (Original) The method according to claim **30**, wherein said demodulating step is performed using QPSK techniques.

33. (Original) The method according to claim **7**, wherein said demodulating step is performed using QPSK techniques.

34. (Original) The method according to claim **9**, wherein said demodulating step is performed using QPSK techniques.

35. (Original) The method according to claim **20**, wherein said demodulating step is performed using QPSK techniques.

36. (Original) The method according to claim **27**, wherein Fast Fourier transformations are applied to each carrier of said multicarrier signal.

What We Claim Is:

1. A method for estimating channel characteristics in a multicarrier transmission system comprising the steps of:

receiving a multicarrier signal;

applying Fast Fourier transformations to carriers of said multicarrier signal;

estimating channel characteristics of a multicarrier channel over which said multicarrier signal was transmitted using iterative processing; and

decoding said transformed multicarrier signal.

2. The method according to claim 1, wherein said iterative processing further comprises the steps of:

determining if a block in a frame in the received signal is a training block;

tentatively decoding said block of said received signal;

calculating a tentative reference signal based on a previous training block;

generating a tentative estimation of channel characteristics using said tentative reference signal;

decoding said block of said received signal;

calculating a reference signal based on said received block;

generating an estimation of channel characteristics using said reference signal;

incrementing the block number;

determining if the end of said frame has been reached;

accepting a next block of received signal if said end of said frame has not been reached; and

iteratively performing the steps above.

3. The method according to claim 2, wherein said decoding steps are performed using $\hat{\mathbf{c}}_n = \arg\min_{\mathbf{c}_n} \sum_m \|\mathbf{x}_{m,n} - \hat{\mathbf{H}}_{m,n}\mathbf{c}_n\|^2$.

4. The method according to claim 2, wherein said calculating steps are performed using $\tilde{\mathbf{H}}_{m,n} = \arg\min_{\mathbf{H}_{m,n}} \sum_m \|\mathbf{x}_{m,n} - \mathbf{H}_{m,n}\hat{\mathbf{c}}_n\|^2$.

5. The method according to claim 2, wherein said first generating step is performed using $\sum_{l=1}^{M_L} \mathbf{B}_l \mathbf{d}(\tilde{\mathbf{H}}_{m,n+1-l}) - \mathbf{d}(\hat{\mathbf{H}}_{m,n}) = 0$

6. The method according to claim 2, wherein said second generating step is performed using $\sum_{l=1}^{M_L} \mathbf{B}_l \mathbf{d}(\tilde{\mathbf{H}}_{m,n+1-l}) - \mathbf{d}(\hat{\mathbf{H}}_{m,n+1}) = 0$.

7. The method according to claim 1, wherein said decoding step further comprises the steps of:

demodulating said multicarrier received signal;

combining said demodulated multicarrier signal using a maximum ratio combiner; and

Viterbi decoding said combined signal.

8. The method according to claim 7, further comprising the step of deinterleaving said combined signal if said combined signal was interleaved for transmission.

9. The method according to claim 2, wherein said decoding step further comprises the steps of:

demodulating said multicarrier received signal;

combining said demodulated multicarrier signal using a maximum ratio combiner; and

Viterbi decoding said combined signal.

10. The method according to claim 9, further comprising the step of deinterleaving said combined signal if said combined signal was interleaved for transmission.

11. The method according to claim 7, wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

12. The method according to claim 9, wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

13. The method according to claim 2, wherein said first generating step is performed using $\sum_{l=1}^{M_1} b_l^T \tilde{H}_{mn+1-l} - \hat{H}_{m,n} = 0$.

14. The method according to claim 2, wherein said second generating step is performed using $\sum_{l=1}^{M_1} b_l^T \tilde{H}_{m,n+1-l} - \hat{H}_{m,n+1} = 0$.

15. The method according to claim 1, wherein Fast Fourier transformations are applied to each carrier of said multicarrier signal.

16. A method for estimating channel characteristics in a multicarrier transmission system comprising the steps of:

receiving a multicarrier signal;

applying Fast Fourier transformations to carriers of said multicarrier signal;

estimating channel characteristics of a multicarrier channel over which said multicarrier signal was transmitted using iterative backward processing, wherein said iterative backward processing further comprises the steps of;

determining if a block in a frame in the received signal is correct;

tentatively decoding said block of said received signal;

calculating a tentative reference signal based on a previous training block;

generating a tentative estimation of channel characteristics using said tentative reference signal;

decoding said block of said received signal;

calculating a reference signal based on said received block;

generating an estimation of channel characteristics using said reference signal;

decrementing the block number;

determining if the beginning of said frame has been reached;

accepting a next block of received signal if said beginning of said frame has not been reached;

iteratively performing the steps above; and

decoding said transformed multicarrier signal.

17. The method according to claim 16, wherein said decoding steps are performed using $\hat{\mathbf{c}}_n = \arg\min_{\mathbf{c}_n} \sum_m \| \mathbf{x}_{m,n} - \hat{\mathbf{H}}_{m,n} \mathbf{c}_n \|^2$.

18. The method according to claim 16, wherein said calculating steps are performed using $\tilde{\mathbf{H}}_{m,n} = \arg\min_{\mathbf{H}_{m,n}} \sum_m \| \mathbf{x}_{m,n} - \mathbf{H}_{m,n} \hat{\mathbf{c}}_n \|^2$.

19. The method according to claim 16, wherein said first generating step is performed using $\sum_{l=1}^{M_L} \mathbf{B}_l \mathbf{d}(\tilde{\mathbf{H}}_{m,n+l-1}) - \mathbf{d}(\hat{\mathbf{H}}_{m,n}) = 0$

20. The method according to claim 16, wherein said second generating step is performed using $\sum_{l=1}^{M_L} \mathbf{B}_l \mathbf{d}(\tilde{\mathbf{H}}_{m,n+l-1}) - \mathbf{d}(\hat{\mathbf{H}}_{m,n-1}) = 0$.

21. The method according to claim 16, wherein said decoding step further comprises the steps of:

demodulating said multicarrier received signal;

combining said demodulated multicarrier signal using a maximum ratio combiner; and

Viterbi decoding said combined signal.

22. The method according to claim 21, further comprising the step of deinterleaving said combined signal if said combined signal was interleaved for transmission.

23. The method according to claim 21, wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

24. The method according to claim 21, wherein said demodulating step is performed concurrently for all signals of said multicarrier signal.

25. The method according to claim 16, wherein said generating steps are performed using $\sum_{l=1}^{M_L} \mathbf{B}_l^T \tilde{\mathbf{H}}_{m,n+l} - \hat{\mathbf{H}}_{m,n} = 0$.

26. The method according to claim 16, wherein Fast Fourier transformations are applied to each carrier of said multicarrier signal.

27. A method for estimating channel characteristics in a multicarrier transmission system comprising the steps of:

receiving a multicarrier signal;

applying Fast Fourier transformations to carriers of said multicarrier signal;

estimating channel characteristics of a multicarrier channel over which said multicarrier signal was transmitted concurrently using iterative processing and iterative backward processing; and

decoding said transformed multicarrier signal.

28. The method according to claim 27, wherein said iterative processing further comprises the steps of:

determining if a block in a frame in the received signal is a training block;

tentatively decoding said block of said received signal;

calculating a tentative reference signal based on a previous training block;

generating a tentative estimation of channel characteristics using said tentative reference signal;

decoding said block of said received signal;

calculating a reference signal based on said received block;

generating an estimation of channel characteristics using said reference signal;

incrementing the block number;

determining if the end of said frame has been reached;

accepting a next block of received signal if said end of said frame has not been reached; and

iteratively performing the steps above.

29. The method according to claim 27, wherein said interactive backward processing comprises the steps of:

determining if a block in a frame in the received signal is correct;

tentatively decoding said block of said received signal;

calculating a tentative reference signal based on a previous training block;

generating a tentative estimation of channel characteristics using said tentative reference signal;

decoding said block of said received signal;

calculating a reference signal based on said received block;

generating an estimation of channel characteristics using said reference signal;

decrementing the block number;

determining if the beginning of said frame has been reached;

accepting a next block of received signal if said beginning of said frame has not been reached; and

iteratively performing the steps above.

30. The method according to claim 27, wherein said decoding step further comprises the steps of:

demodulating said multicarrier received signal;

combining said demodulated multicarrier signal using a maximum ratio combiner; and

Viterbi decoding said combined signal;

31. The method according to claim 30, further comprising the step of deinterleaving said combined signal if said combined signal was interleaved for transmission.

32. The method according to claim 30, wherein said demodulating step is performed using QPSK techniques.

33. The method according to claim 7, wherein said demodulating step is performed using QPSK techniques.

34. The method according to claim 9, wherein said demodulating step is performed using QPSK techniques.

35. The method according to claim 20, wherein said demodulating step is performed using QPSK techniques.

36. The method according to claim 27, wherein Fast Fourier transformations are applied to each carrier of said multicarrier signal.